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**A2E5 A2H5 A8A A8B2 A8C6 A8D3**

(56) Documents Cited

**US 5480607 A**

**US 5454708 A**

(58) Field of Search

**UK CL (Edition Q ) B5A AD37T AMA AMC AT15L**

**AT15P**

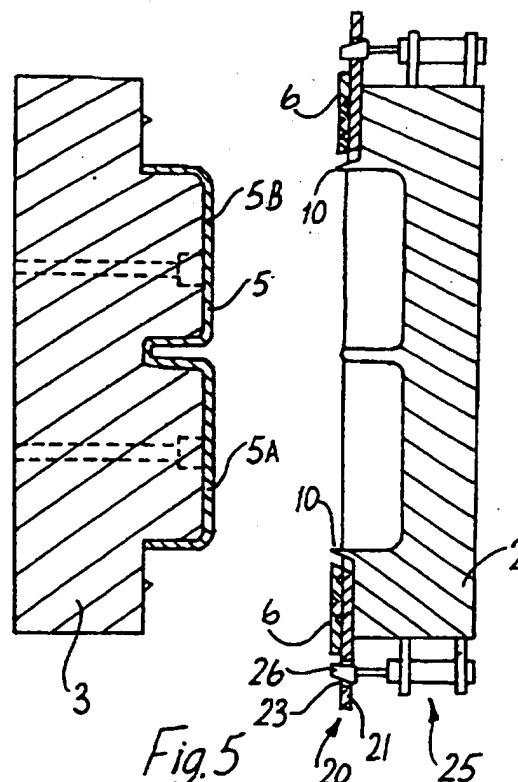
**INT CL<sup>6</sup> B29C 37/02 49/50**

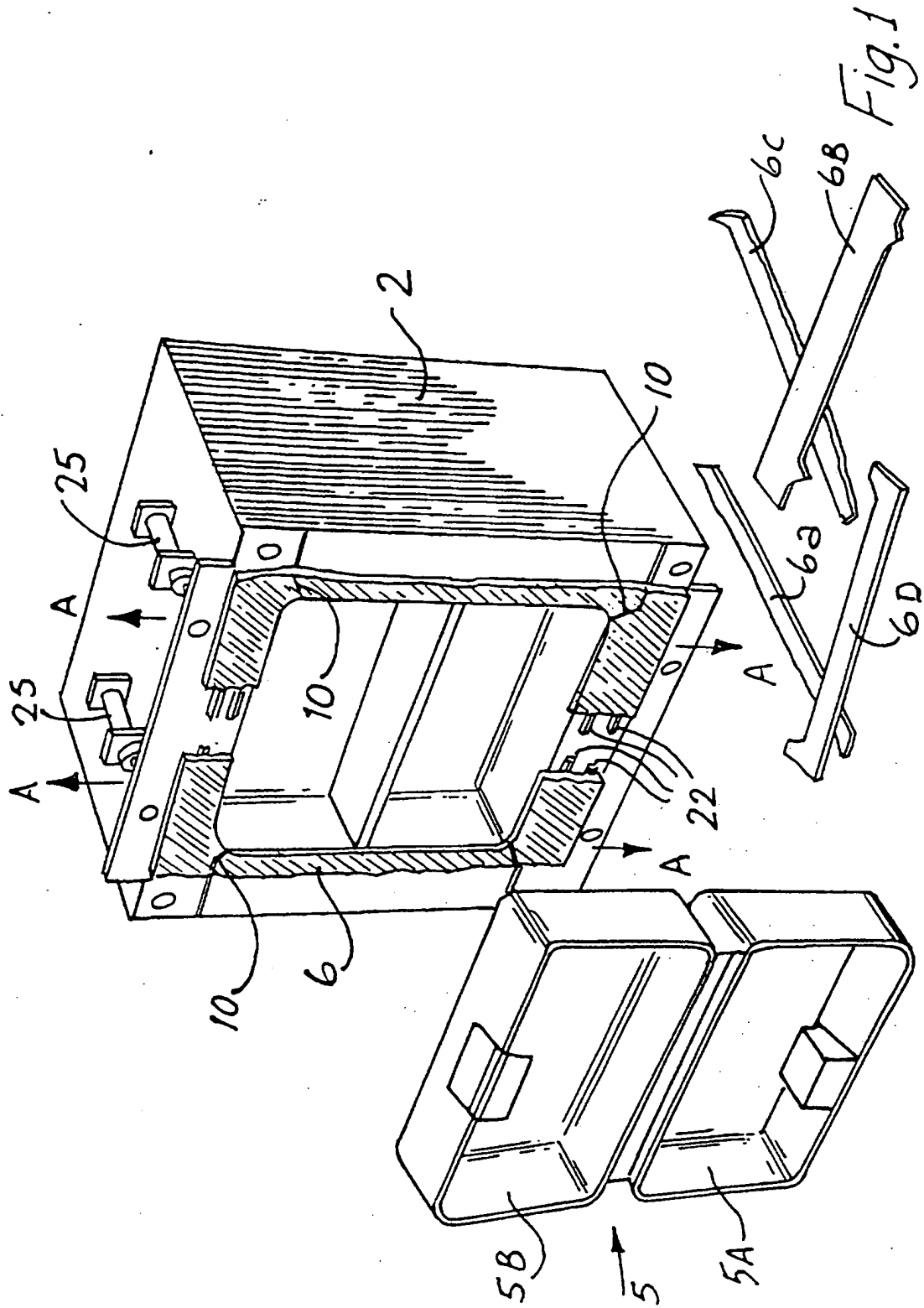
**ONLINE: WPI,PAJ,EPODOC**

(54) Abstract Title

**Flash removal during blow moulding**

(57) Flash product 6 is removed from a blow moulded article 5 within the mould 2,3 by retaining the flash 6 on one mould part 2 and the article 5 on the other mould part 3. The article 5 is formed using extrusion blow moulding, a cavity between the pair of mould halves 2,3 receiving an extruded parison of thermoplastics material, and the parison thereafter being inflated to form the blow moulded article 5 and surrounding flash 6. The flash 6 is preferably separated from the article 5 using in-mould cutting blades 10 to form a number of flash pieces (6a-6d, figure 1). The flash pieces (6a-6d, figure 1) are preferably retained on the one mould part 2 by a plurality of gripping teeth (22, figure 6) located on an insert 21. A ram 25 may be used to pull the flash pieces (6a-6d, figure 1), which are still retained by the teeth (22, figure 6), away from the moulded article 5, the flash pieces (6a-6d, figure 1) being allowed to drop away from the mould part 2 as the two mould parts 2,3 are separated from each other.





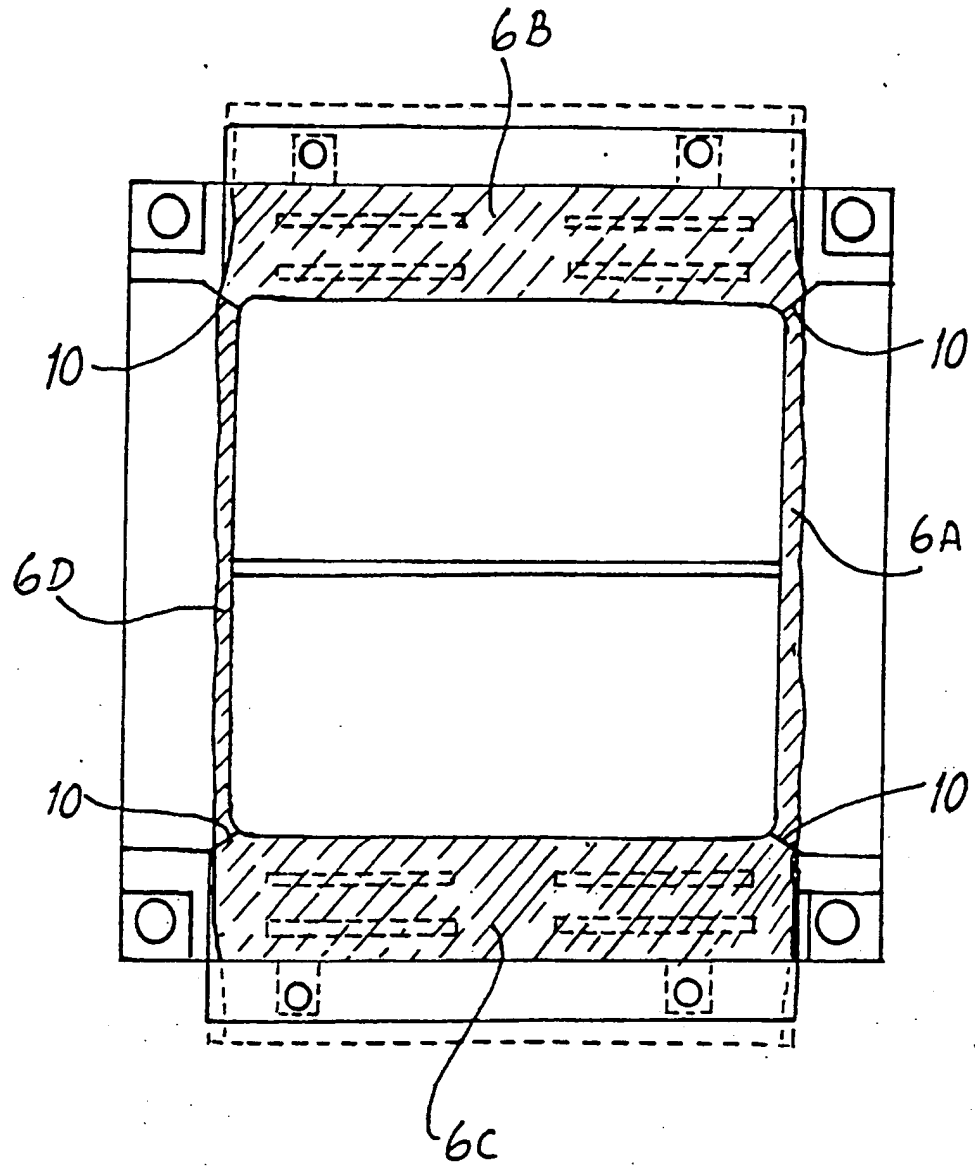


Fig. 2

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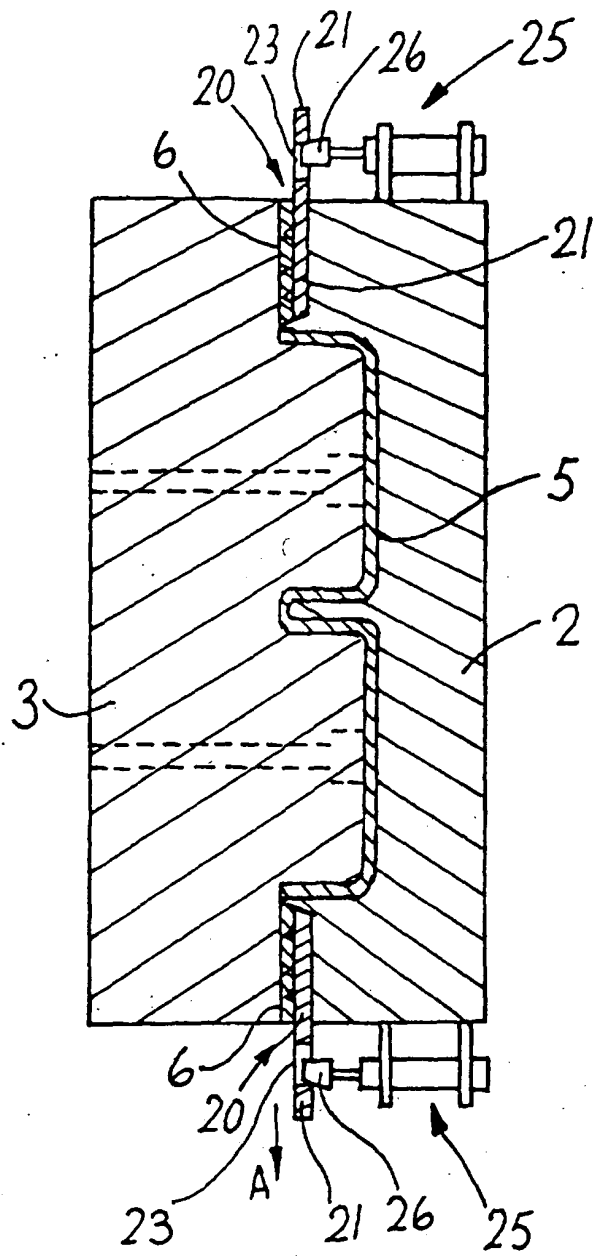


Fig. 3

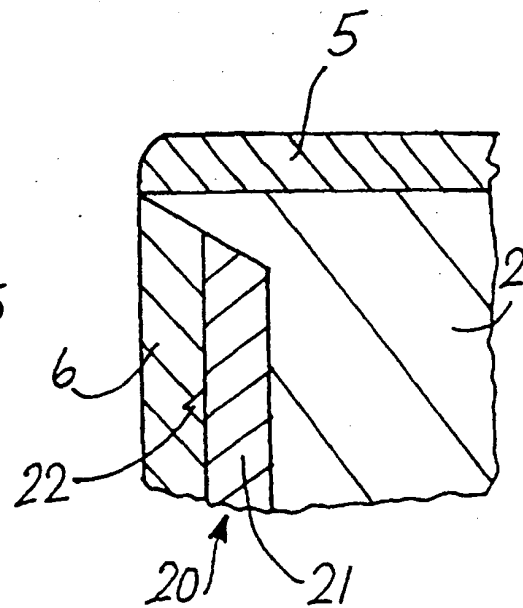
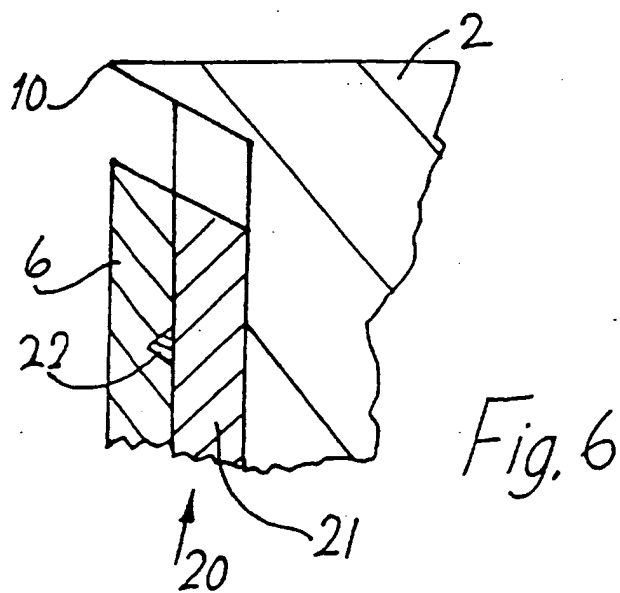
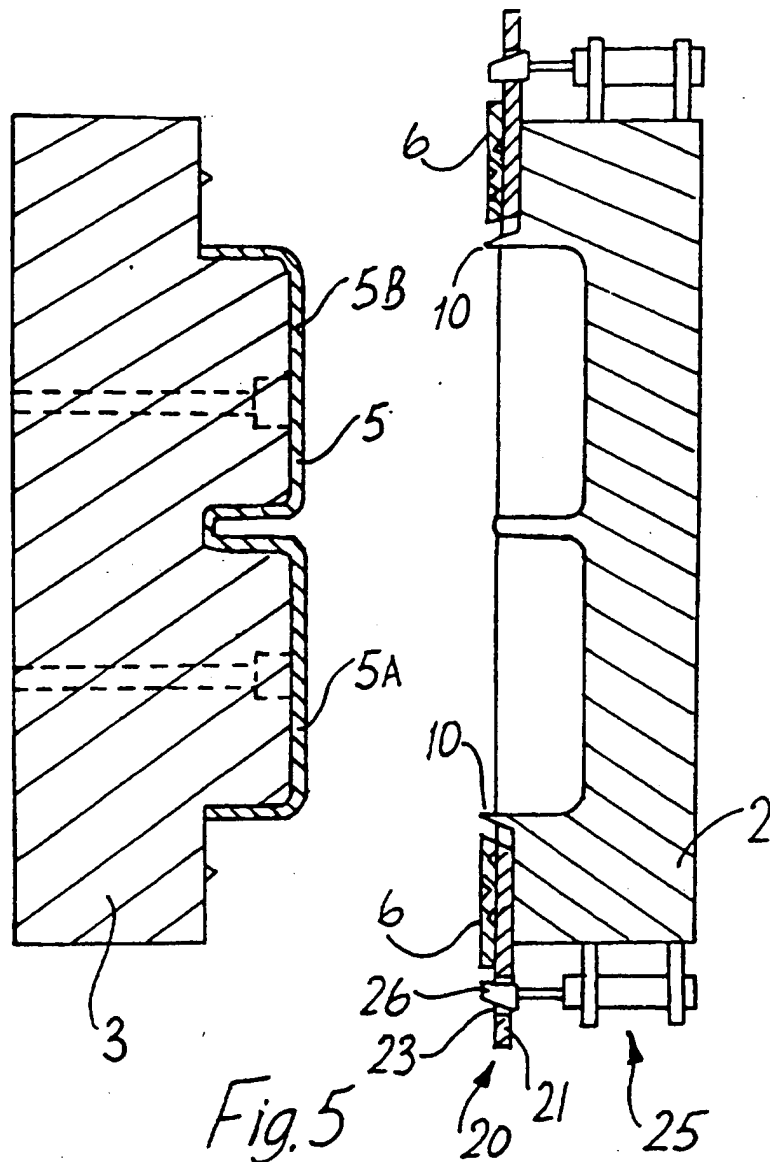


Fig. 4



## "BLOW MOULDING APPARATUS AND METHOD"

### Introduction

5       The invention relates to a method and apparatus for blow moulding articles.

One of the biggest problems in blow moulding is the handling and processing of the article after moulding. Flash is formed as part of the moulding process and considerable handling is required to remove this from the moulded article.  
10       Handling is itself difficult because the article is relatively hot. The removal of the flash is also inefficient in terms of quality as manually operated cutting blades are used and the operation is dependent on the skill of the operator and the cutting efficiency of the blade which deteriorates in use.

15       There is therefore a need for a blow moulding method and apparatus which will alleviate at least some of these problems. This invention is directed towards providing such a method and apparatus.

### Statements of Invention

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According to one aspect the invention provides a method of blow moulding comprising the steps of: -

25               extruding a parison of hot thermoplastics material;

                  closing a pair of mould halves around the extruded parison;

                  penetrating the parison with a blow pin;

30

                  blowing air through the blow pin to inflate the parison against the walls of the mould halves to form a moulded article and surrounding flash;

separating the flash from the article in the mould by retaining the flash on one mould part while retaining the article on the other mould; and

5

opening the mould halves.

In one embodiment of the invention the separation of the flash and the article includes the step of in-mould cutting of the flash to form a number of flash pieces.  
10 Preferably the flash pieces are released on opening of the mould.

In a preferred embodiment of the invention the separation of the flash and the article includes in-mould pulling of the flash away from the moulded article.

15 In this case preferably separation of the flash and the article includes in-mould gripping and pulling of the flash away from the article.

In a preferred aspect the method includes the step of partially opening the mould halves before pulling the flash away from the moulded article.

20

Preferably the flash is pulled away from the article by engaging the flash with an in-mould flash engagement means and moving the engagement means relative to the moulded article to separate the flash from the moulded article.

25 In another aspect the invention provides a blow moulding apparatus comprising: -

a pair of mould halves for receiving an extruded parison of thermoplastics material therebetween;

means for inflating the parison to form a blow moulded article and surrounding flash; and

5 means for separating the flash from the article in the mould so that the moulded article is retained on one mould half and the flash is retained on the other mould half.

10 In one embodiment of the invention the separating means for separating the flash from the article includes in-mould cutting means for cutting the flash in the mould to form a number of pieces of flash.

In a particularly preferred embodiment of the invention the separating means includes means for in-mould pulling of the flash away from the moulded article.

15 Preferably the separating means comprises flash engagement means for in-mould gripping of the flash and means for moving the engagement means relative to a moulded article to pull the flash away from the moulded article.

20 The invention also provides articles whenever blow moulded by a method and/or using an apparatus of the invention.

#### Brief Description of the Drawings

25 The invention will be more clearly understood from the following description thereof given by way of example only with reference to the accompanying drawings, in which: -

Fig. 1 is a schematic perspective view illustrating the blow moulding apparatus and method of the invention;



Fig. 2 is a front view of one mould port;

Fig. 3 is a cross sectional view of the mould in a closed configuration;

5 Fig. 4 is an enlarged view of a detail of part of the mould of Fig. 3;

Fig. 5 is a cross sectional view of the mould in an open configuration; and

10 Fig. 6 is an enlarged view of a detail of part of the mould of Fig. 5.

#### Detailed Description

Referring to the drawings there is illustrated a method and apparatus for blow moulding according to the invention. A parison of hot thermoplastics is first  
15 extruded and a pair of mould halves comprising a die 2 and a core 3 are closed around the extruded parison. The parison is then penetrated with a blow pin and air is blown through the blow pin to inflate the parison against the walls of the die 2 and core 3 to form a moulded article 5 and flash 6 in the form of a flange extending around the article 5. In this case the article 5 is a case comprising a top  
20 case part 5A and a bottom case part 5B which are hinged together. However, this article is used for illustrative purposes only, the article may be any blow moulded article.

In the invention the flash 6 is separated from the blow moulded article 5 while the  
25 flash 6 and article 5 are still in the mould. This is achieved by retaining the flash 6 on the die 2 while retaining the article 5 on the core 3. On opening of the mould, the flash 6 falls off the die 2 while the article 5 without flash is removed from the core 3 for further processing.

30 The separation of the flash 6 from the article 5 includes the step of in-mould cutting of the flash 6 to form a number of flash pieces 6A, 6B, 6C, 6D which are

more easily collected and re-processed. The flash cutting means is provided by four corner blades 10 which are arranged to extend outwardly from the four corners of the article 5 through the flash 6 to cut the flash in the mould into four separate pieces 6A, 6B, 6C, 6D. On opening of the mould, the flash pieces 6A, 6B, 6C, 6D are released and collected on a conveyor below the mould. The flash pieces are typically delivered by the conveyor to a grinder which grinds the flash pieces into particles for recycling.

The flash 6 is pulled away from the article 5 by flash engagement means 20 which grip the flash 6 in the mould and ram means 25 for moving the flash engagement means 20 relative to the moulded article 5 to pull the flash 6 away from the article 5.

Each flash engagement means 20 comprises an insert 21 having a plurality of gripping teeth 22 for engagement with flash 6. The insert 21 is slidably movable by the ram means 25 from a closed position illustrated in Figs. 3 and 4 to a flash release position as illustrated in Figs. 5 and 6. Each insert 21 has a tapered hole 23 which is engagable with a complementary tapered headpiece 26 carried by the ram 25. As the ram 25 is extended the tapered headpiece 26 engages in the tapered hole 23 to pull the insert 21 outwardly in the direction of the arrow A to release the flash 6. In this way the flash 6 is retained on the die 2 on opening of the mould, is cut and is allowed to fall from the mould, without handling.

In use, after inflation of the parison the cutting blades 10 cut the flash 6 into pieces while it is still in the mould. The moulding clamping force is then released and the mould parts move apart slightly by about 1 mm or less. The rams 25 are operated to pull the flash pieces 6A, 6B, 6C, 6D away from the article 5. The mould is then fully open leaving the de-flashed article on the core 3 and allowing the flash pieces which remain on the die 2 to drop away from the mould for recycling.

5 This invention dramatically improves the efficiency of blow moulding. Because the flash removal and flash pre-cutting takes place in the mould the handling of the article and flash post-moulding is at least hugely reduced and may be eliminated. Thus, the invention provides considerable labour cost savings. Product quality is also improved because the flash is removed from a blow moulded article in a predictable manner in every cycle of operation.

10 The invention is not limited to the embodiments hereinbefore described which may be varied in construction and detail.

CLAIMS

1. A method of blow moulding comprising the steps of: -
  - 5 extruding a parison of hot thermoplastics material;
  - closing a pair of mould halves around the extruded parison;
  - penetrating the parison with a blow pin;
  - 10 blowing air through the blow pin to inflate the parison against the walls of the mould halves to form a moulded article and surrounding flash;
  - 15 separating the flash from the article in the mould by retaining the flash on one mould part while retaining the article on the other mould; and
  - opening the mould halves.
- 20 2. A method as claimed in claim 1 wherein the separation of the flash and the article includes the step of in-mould cutting of the flash to form a number of flash pieces.
- 25 3. A method as claimed in claim 2 wherein the flash pieces are released on opening of the mould.
4. A method as claimed in any preceding claim wherein the separation of the flash and the article includes in-mould pulling of the flash away from the  
30 moulded article.

5. A method as claimed in claim 4 wherein separation of the flash and the article includes in-mould gripping and pulling of the flash away from the article.
- 5 6. A method as claimed in claim 4 or 5 including the step of partially opening the mould halves before pulling the flash away from the moulded article.
- 10 7. A method as claimed in any of claims 4 to 6 wherein the flash is pulled away from the article by engaging the flash with an in-mould flash engagement means and moving the engagement means relative to the moulded article to separate the flash from the moulded article.
- 15 8. A method of blow moulding substantially as hereinbefore described with reference to the accompany drawings.
9. A blow moulding apparatus comprising: -
  - 20 a pair of mould halves for receiving an extruded parison of thermoplastics material therebetween;
  - means for inflating the parison to form a blow moulded article and surrounding flash; and
  - 25 means for separating the flash from the article in the mould so that the moulded article is retained on one mould half and the flash is retained on the other mould half.

10. Apparatus as claimed in claim 9 wherein the separating means for separating the flash from the article includes in-mould cutting means for cutting the flash in the mould to form a number of pieces of flash.
- 5 11. Apparatus as claimed in claim 10 wherein the separating means includes means for in-mould pulling of the flash away from the moulded article.
12. Apparatus as claimed in claim 11 wherein the separating means comprises flash engagement means for in-mould gripping of the flash and means for  
10 moving the engagement means relative to a moulded article to pull the flash away from the moulded article.
13. Blow moulding apparatus substantially as hereinbefore described with reference to the accompanying drawings.
- 15 14. Articles whenever blow moulded by a method as claimed in any of claims 1 to 8 and/or using an apparatus as claimed in any of claims 9 to 13.



Application No: GB 9900345.1  
Claims searched: 1-14

Examiner: Dr Steve Chadwell  
Date of search: 23 March 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): B5A (AD37T, AMA, AMC, AT15L, AT15P)

Int CI (Ed.6): B29C 37/02 49/50

Other: Online: WPI, PAJ, EPODOC

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	US 5480607 (HOBSON)	
A	US 5454708 (COLEMAN)	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.